Ginseng

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Scientific Name and Introduction: American ginseng (*Panax quinquefolium* L.), Chinese Sanch'i ginseng (*Panax notoginseng*), Japanese ginseng (Chikusetsu-ningin) (*Panax japonica*), and Korean ginseng (*Panax ginseng* C.A Meyer) are all perennials of the Araliaceae family (Bae, 1978). The edible portion is the main root with two to five lateral roots. Ginseng is used as a cure-all medicine in Asia (Proctor, 1990). Ginseng is primarily grown between 30º to 48º North latitude in Canada, China, Korea, U.S., etc.

Quality Characteristics and Criteria: High quality ginseng has a firm main root without defects. They should be clearly defined to show a head (rhizome), body (main root), and legs (lateral roots).

Horticultural Maturity Indices: Ginseng is usually harvested 3 to 5 years after transplanting 1-year-old seedlings. The optimum time for harvest is August to October in Korea, when their medicinal value is highest.

Grades, Sizes and Packaging: Ginseng is initially classified by the age of the root and then by external appearance. Size grades are: First, > 6 cm (2.4 in) long and 60 g (0.13 lb); Second, 4 to 6 cm (1.8 to 2.7 in) and 40 to 60 g (0.09 to 0.13 lb); and Third, 3 to 4 cm (1.2 to 1.8 in) and 30 to 40 g (0.07 to 0.09 lb). Packaging varies greatly.

Pre-cooling Conditions: Ginseng roots are commonly hydro-cooled or forced-air cooled to below 5 ºC (41 °F). Cooling generally retards subsequent deterioration such as weight loss and decay.

Optimum Storage Conditions: Ginseng should be stored at 0 ºC (32 °F) with > 95% RH. Roots retain good quality for 2 mo at 0 ºC (Yun, 1998) and 20 days at 25 ºC (77 °F) (Oh et al., 1979).

Controlled Atmosphere (CA) Considerations: Reduced microorganism growth and attenuated cavitation are the major benefits of CA. Optimal CA is 1% O_2 + > 5% CO_2 (Lee and Kim, 1979; Yun and Lee, 1998). Cavitation is significantly reduced at 15% CO_2 (Yun, 1998).

Retail Outlet Display Considerations: Ginseng roots are displayed with green leafy vegetables, and water loss is controlled by humidification or packaging.

Chilling Sensitivity: Ginseng is not chilling sensitive and should be stored as cold as possible without freezing.

Ethylene Production and Sensitivity: Ginseng roots produce only minute amounts of ethylene and are not sensitive to ethylene.

Respiration Rates:

Temperature	mg CO_2 kg^{-1} h^{-1}
0 °C	5.5
10 °C	15.0
15 °C	33.0
25 °C	95.0

To get mL kg^{-1} h^{-1}, divide the mg kg^{-1} h^{-1} rate by 2.0 at 0 °C (32 °F), 1.9 at 10 °C (50 °F), and 1.8 at 20 °C (68 °F). To calculate heat production, multiply mg kg^{-1} h^{-1} by 220 to get BTU per ton per day or by 61 to get kcal per metric ton per day. Data are from Lee and Kim (1979).

Physiological Disorders: The formation of cavities within the root is a common problem caused by cultural conditions and catabolism of starch (Park et al., 1986; Yun, 1998). Others disorders include discolored skin and flesh, splitting of the main root.

Postharvest Pathology: Gray mold (*Botrytis cinerea*) is common in ginseng (Oh et al., 1981). Lesions frequently begin in wounds and spread to other areas of the roots. Storage at low temperatures or CA slows the rate of spread of the disease and should be maintained to minimize pathological disorders and prolong shelf-life.

Quarantine Issues: None.

Suitability as Fresh-cut Product: No current potential.

Special Considerations: Careful handling is mandatory because it is easy to bruise the surface of main roots and break lateral roots. Damaged areas provide a route for entry of microorganisms.

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